

# Versatile Optical Storage Driving Device for Multimedia Audio/Video System

## **Background**

### **Field of the invention**

The invention relates to a versatile optical storage driving device for multimedia audio/video system incorporated with functions of a compact-disc driver (CD), a digital versatile disc (DVD), a frequency modulated (FM) radio and a MP3 music CD player, especially to a versatile optical storage driving device characterized in that it is possible to be used as a built-in and/or external-connected CD-ROM/CD-RW driver operated through the operation system of PC with PC on, or as an independent CD-ROM/CD-RW driver operated by itself with PC off, and as a digital picture viewer and audio/video player capable of displaying photograph/picture and audio/video disc through a built-in/external-connected display device as well as a digital recorder capable of recording audio/video signal.

### Related art of the invention

Generally, the CD (i.e., optical storage means) driver installed in systems such as desktop personal computer (PC), notebook PC, tablet PC and Macintosh PC is a storage device used to read/write information in an optical manner. In fact, the CD driver is the most important technology developed in the field of data storage since the invention of the magnetic diskette driver. Such technology has combined the advantages of having huge storage capacity as the high-density magnetic tape, capable of performing fast random access and fast searching, the long-term preservation of data stored therein and capable of storing information at low cost. With high precision, such technology has already profoundly applied to various industrial divisions such as television, stereo system, image storage and data processing.

Currently, the personal computer (PC) has become the popular personal data processing device while the CD driver has played an important role in the PC. However, when the PC is not in use, the CD driver installed therein is also left unused. It is rather inconvenient that one have to add a DVD driver in order to read the contents of a digital versatile disc, to use a radio to listen to the broadcast of a frequency modulated radio station, and to turn on the computer in order to receive and play the sound music of a MP3 musical CD.

Therefore, the inventor has disclosed in R.O.C. patent application no. 92129900 filed on Oct. 28, 2003, a device on one hand capable of achieving the effect of space consuming, increased convenience, and low cost without the operation system of the PC, while on the other hand capable of monolithically integrating in a single device a CD driver for playing audio/video compact disc, a DVD driver for playing digital versatile disc, a frequency modulated radio for receiving frequency modulated music, and an CD player of MP3 music for playing music stored thereon.

However, after the research and market survey, it is found to be necessary for the device disclosed in the patent application no. 92129900 being a stand-alone type that can be moved freely like a household electric appliance operated in both AC and DC (convenient for outdoor use) power supply, for example, it is preferable for such device to have functions of Hi-Fi stereo amplifier, audio/video signal recording, photograph/picture displaying/storing, while easily working as a television or projector through a built-in/externally connected display.

### **Summary of the invention**

Therefore, an object of the present invention is to provide a versatile optical storage driving device for multimedia audio/video system incorporated with functions of a compact-disc (CD) driver, a digital versatile disc (DVD) driver,

a frequency modulated (FM) radio and a MP3 music CD player, such versatile optical storage driving device is characterized in the possibility of being a built-in and/or external-connected CD-ROM/CD-RW driver operated through the operation system with PC on or being a stand-alone CD-ROM/CD-RW driver operated by itself with PC off, and being a digital picture viewer and video player capable of displaying photograph/picture and audio/video disc through a built-in/external-connected display device as well as being a digital recorder capable of recording audio/video signal.

To achieve the above object, a versatile optical storage driving device for multimedia audio/video system is provided in accordance with one aspect of the present invention, with a CD driver, a picture viewer, a DVD driver, a digital video recorder (DVR), a FM radio and a MP3 music CD player monolithically integrated in a single device comprising: a video/audio input/output selector, connected to a built-in/external device for inputting/outputting video/audio signal; a video/audio encoder/decoder, for encoding input video/audio signal before storing and for decoding stored video/audio signal before outputting to the built-in/external device through the video/audio input/output selector; a microprocessor, for controlling the operation of the optical storage device/memory card reader in accordance with a key-in or pre-stored instruction and the read/write of the BIOS data

of a computer's mother board; an optical storage device, for reading/writing the encoded video/audio signal and data from the microprocessor through a bus switch; a memory card reader, for reading/writing the encoded video/audio signal and data from the microprocessor through the bus switch connected to the microprocessor; a display controller, connected to the microprocessor for controlling the display of a status display; a status display, for displaying operation status of the memory card reader, the personal computer and the optical storage driving device; a power amplifier, connected to the video/audio encoder/decoder for amplifying the input signal and decoded output audio signal; and a speaker, connected to the power amplifier for outputting the amplified audio signal.

In another aspect, the versatile optical storage driving device for multimedia audio/video system further comprises a power-on detector, connected to a power supply on PC and a bus switch, for determining the power-on status of the PC, the microprocessor controls the bus switch to release and standard interface between the PC and the optical storage driving device so as to conduct operation without the operating system (OS) of PC when PC is off, while once a PC power-on status is detected, the microprocessor controls said bus switch to resume the function of the standard interface so as to operate the optical storage driving device through the PC.

In still another aspect of the present invention, the optical storage driving device is of stand-alone type. In yet another aspect of the present invention, the optical storage driving device is of portable type. In further aspect of the present invention, the optical storage driving device can be built-in to a personal computer or externally connected thereto. In still further aspect of the present invention, the built-in/external device can be a video/audio signal providing device and a video/audio signal player such as television, projector, plasma display panel, liquid crystal display and monitor of a personal computer. In yet further aspect of the present invention, the optical storage device includes such as CD-ROM, CD-R, CD-RW, DVD-ROM, DVD-R, DVD-RW, DVD+R, DVD+RW and DVD-RAM servers.

In furthermore aspect of the present invention, the status display includes one of the vacuum fluorescent display (VFD) and the liquid crystal display (LCD). In still furthermore aspect of the present invention, the display is used to display the mode selection, adjustment controlling, and status indicator of these functions.

In yet furthermore aspect of present invention, the personal computer includes one of a desktop personal computer, notebook personal computer, tablet personal computer and Macintosh computer. In still other aspect of the present invention, the

standard interface can be one of the ATAPI-IDE, the serial ATA or SCSI, the USB 1.1/2.0 built-in or externally connected to a personal computer and a IEEE 1394 standard interface.

In yet other aspect of the present invention, the power-on detector is used to detect the voltage on the power supply unit of a personal computer or to detect the computer's host reset signal (HRST) on the connecting bus between the personal computer and the panel controller so as to confirm the on status of the power supply.

The versatile optical storage driving device of the present invention further comprises a connecting device, equipped with a power connector, a CD analogue audio output connector and a Sony-Phillips digital interface (SPDIF) output connector, while the connecting device has a dominating bus and an input/output bus so as to increase the expandability of the optical storage driving device.

#### **Brief description of drawings**

The above and other objects, features, and advantages of the present invention will become more apparent from the detailed description in conjunction with the following drawings:

Fig. 1 is a schematic view showing an optical storage driving device in accordance with a preferred embodiment of the present invention.

Fig. 2 is a circuit diagram showing the structure of a power-on detector of the optical storage driving device in accordance with the preferred embodiment of the present invention.

Fig. 3A and 3B are diagrams showing the structure of a connecting device of the optical storage driving device in accordance with the preferred embodiment of the present invention.

### **Detailed description of the invention**

Referring to Fig. 1, a schematic structure of an optical storage driving device in accordance with a preferred embodiment of the present invention is shown. In Fig.1, a versatile optical storage driving device 11 for multimedia audio/video system comprises: a video/audio input/output selector 1, for inputting video/audio signals such as video/audio signal of TV tuner, composite video signal and audio signal coming from a external device (not shown) and for outputting video/audio signals to external devices such as monitor of PC and TV; a video/audio encoder/decoder 2, connected to the video/audio input/output selector 1 for encoding input video/audio signal before storing and for decoding stored video/audio signal before outputting to said external device (i.e., outputting via a D-Sub/DVI interface to a PC) through the video/audio input/output selector 1; a microprocessor 3, for controlling the operation of the optical storage device in accordance with a key-in or pre-stored instruction, as shown in Fig. 1, where



the microprocessor 3 is possible to input/output data indirectly from a computer device such as PC, through an USB/IEEE interface connector, or directly from the video/audio encoder/decoder 2; an optical storage device 4, for storing the encoded video/audio signal and data coming from the microprocessor through a bus switch 5, the optical storage device 4 is not restricted to an optical storage device server like DVD-ROM server but expandable to cover other optical storage device servers such as CD-ROM, CD-R, CD-RW, DVD-ROM, DVD-R, DVD-RW, DVD+R, DVD+RW and DVD-RAM servers, where the connecting interface of the optical storage device 4 can be, but not restricted to, a ATAPI-IDE (AT Attachment Pocket Interface-Integrated Dual Enhancement) interface or a SCSI (Small Computer System Interface) interface connector, and it can also be a serial ATA interface connector, moreover, as described on above, the versatile optical storage driving device 11 of the present invention can be connected to an external PC via an USB/IEEE interface connectors such as USB 1.1/2.0 and IEEE 1394; a memory card reader 6, connected to the microprocessor for reading/writing the encoded video/audio signal and data coming from the microprocessor; a display controller 7, connected to the microprocessor for controlling the display of a status display; a status display 8, for displaying the operation status of the memory card reader, the optical storage device 11 and the BIOS of the personal computer, for example the status display 8 can be a vacuum fluorescent

display (VFD) or a liquid crystal display (LCD); a power amplifier 9, connected to the video/audio encoder/decoder 2 for amplifying the input signal and decoded output audio signal; and a speaker 10, connected to the power amplifier for outputting the amplified audio signal.

As described above, the connecting interface of the optical storage driving device 11 can be an ATAPI-IDE interface, a serial ATA interface or a SCSI interface capable of conducting self-detection on whether a bus line is inserted or not, so that it is possible to automatically or manually link the optical storage driving device 11 to a computer or other device after a bus line is inserted. Therefore, since the optical storage driving device 11 of the present invention has been equipped with interfaces such as an ATAPI-IDE interface, a serial ATA interface or a SCSI interface, USB 1.1/2.0 and IEEE 1394, therefore the optical storage driving device 11 can be used as a built-in or external device connected to personal computers such as a desktop PC, a notebook PC or tablet PC.

Fig. 2 is a circuit diagram showing the structure of a power-on detector 30 of the optical storage driving device in accordance with the embodiment of the present invention. In general, being incorporated in the microprocessor, the power-on detector 30 is connected to the power supply of an external PC to detect the existence of the working voltage of PC and is

connected to the ATAPI-IDE interface of PC to detect the existence of HRST, the PC is in power-on status if one of the above signal is detected while in power-off status if none of the above signal is detected. When PC is power-on, the power-on detector 30 sends a detection signal to the microprocessor 3 for controlling the on/off operation of the bus switch 5.

Referring to Fig. 3A and 3B, a connecting device of the optical storage driving device in accordance with the embodiment of the present invention is schematically described. In Fig. 3A, there is a diagram showing the structure of a connecting device of the optical storage driving device in accordance with the embodiment of present invention, wherein the optical storage driving device is monolithically integrated in a single device the functions of a CD, a picture viewer, a DVD, a DVR, a FM radio and a MP3 musical CD player. The connecting device includes a power-on detector 38, an analogue audio output connector of optical storage driving device 35 and a SPDIF-type output connector 36, and the connecting device is characterized in a dominator connector 37 having a dominating bus and an input/output bus in order to increase the expandability of the optical storage driving device.

In Fig. 3A, an embodiment of the connecting board connected to PC is shown, on the left side of said connecting board is

provided with a power connector 38, an analogue audio output connector of optical storage driving device 35 and SPDIF-type output connector 36 as well as a Dominator connector 37 with a dominating bus and a input/output bus (not shown); while on the right side of said connecting board is provided with a back bracket input 31, a back bracket input 32, an FM antenna 33 and a 12-volt DC input 34. In the central portion of Fig. 3A, the cross section of the connecting device of the optical storage driving device is shown, while in the far left side and the far right side of Fig. 3A, a plane view showing the supporting mount and the connector of the connecting device are shown, respectively.

In Fig. 3B, another embodiment of the connecting board connected to PC is shown, on the left hand side a standard accessory, i.e. a supporting mount, opposite to the supporting mount in Fig. 3A is provided, and on the right hand side of the figure an optional supporting mount is provided, in which same reference number is used to indicate like parts in different figures.

Further, besides the above described function for optical storage device, the optical storage driving device 11 of the present invention is further integrated therein a complicate functions of mini Hi-Fi stereo system, digital picture viewer and digital video player/recorder, so that the user of a PC not

only enjoy the performance of a optical storage device but also the joy came from photograph as well as digital video signal without an extra set of space consuming stereo, DVD player and a DVR, in another word, greatly increase the additional value of the optical storage device.

Furthermore, the stereo system, digital picture viewer and digital recorder/player of the optical storage driving device can be a stand-alone device requires no interface to computer but operates like an ordinary household consumer electrical appliance. With such stand-alone device, one may listen to CD, MP3 and FM radio, watching digital photograph and digital video program, storing picture files and recording video signals without making use the CPU resources of a PC.

However, above described are preferred embodiments of the invention but not intended to be the limit of the invention, various change and modification without departing from the claim must be considered as fall within the scope of the invention. For instance, the optical storage device refers to well known compact disc drive including CD-DA (digital audio CD), VCD (video CD), and SVCD (super VCD), DVD and digital video recorder; said IEEE 1394 interface includes IEEE 1394a and IEEE 1394b for transmission rate of 400 MB/sec and 800 MB/sec, respectively.

## **Description of symbol**

numeral description

- 1 video/audio input/output selector
- 2 video/audio encoder/decoder
- 3 microprocessor
- 4 optical storage device
- 5 bus switch
- 6 memory card reader
- 7 display controller
- 8 status display
- 9 power amplifier
- 10 speaker
- 11 optical storage driving device
- 30 power-on detector
- 31 back bracket input
- 32 back bracket output
- 33 antenna of frequency modulated radio (FM antenna)
- 34 DC input
- 35 analogue audio output connector of optical storage  
driving device
- 36 SPDIF-type output connector
- 37 dominator connector
- 38 power connector